May 27, 1969 T. W. BUSHNELL 3,446,104

WEB SLITTING MACHINE

Filed March 6, 1967 Sheet 1 of 2

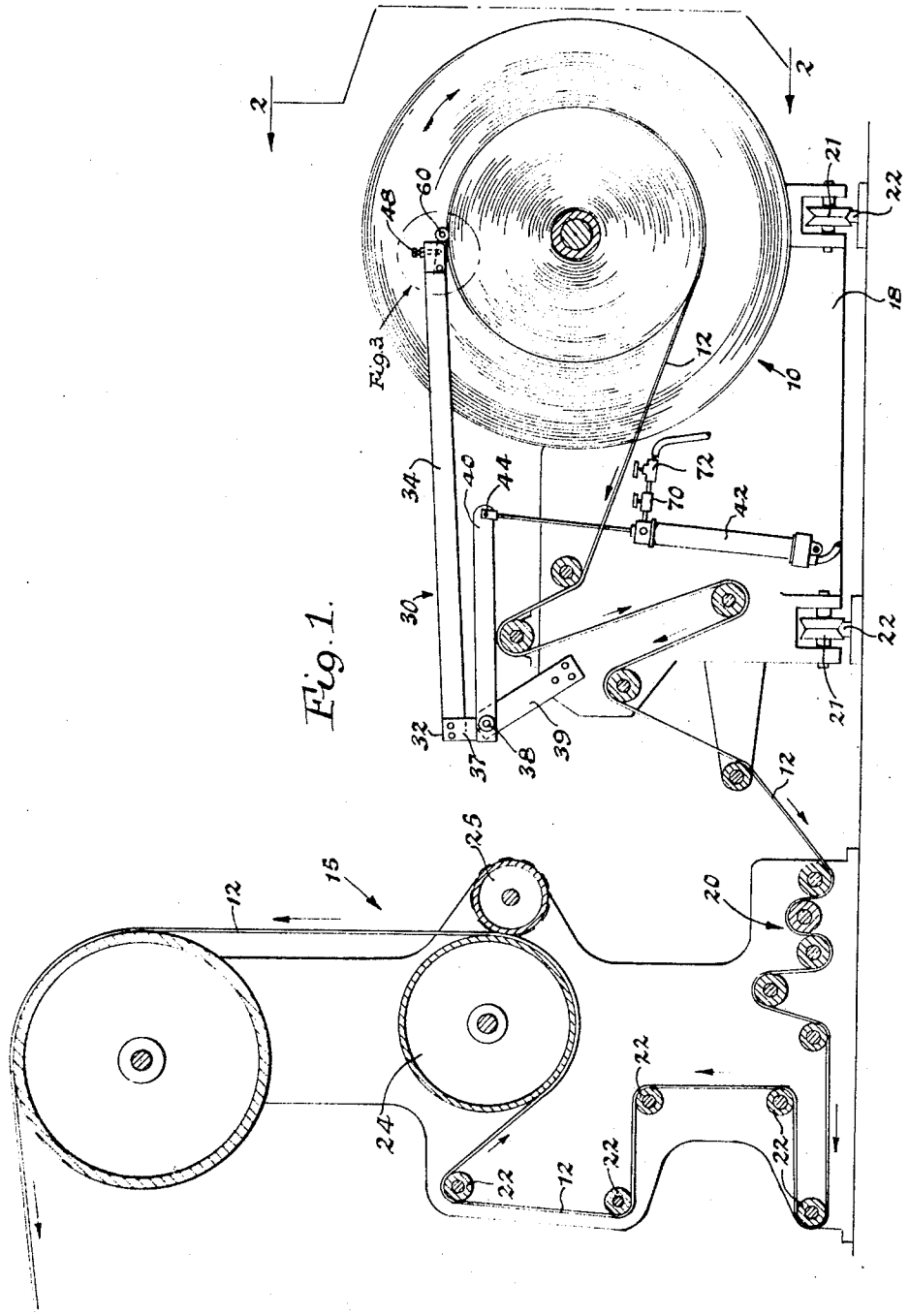


Fig. 1.

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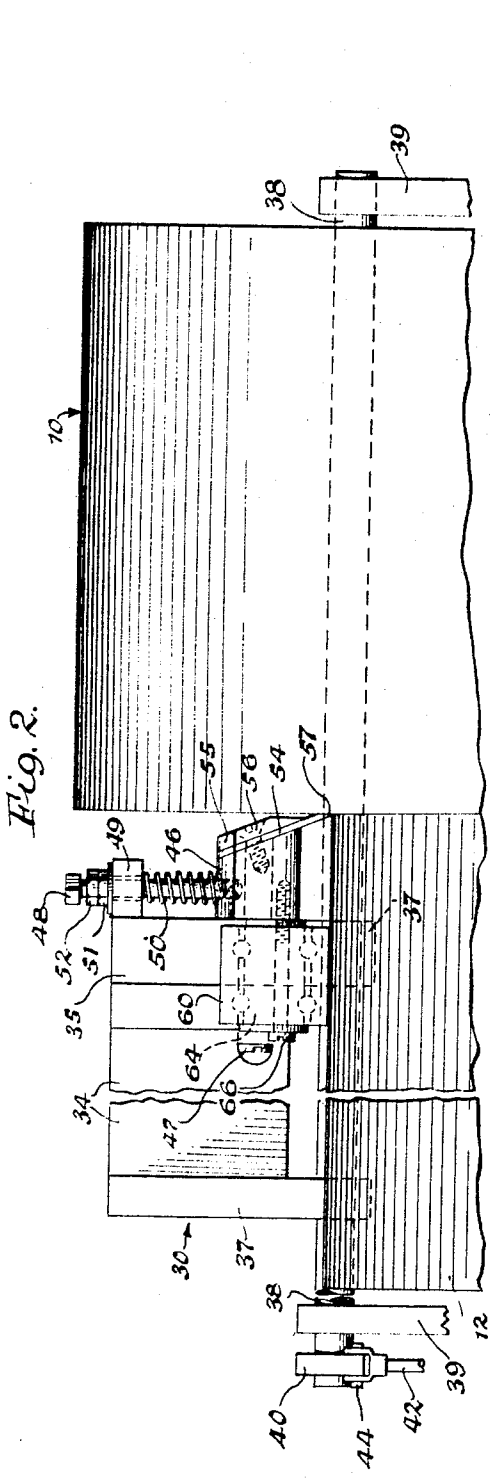


Fig. 2.

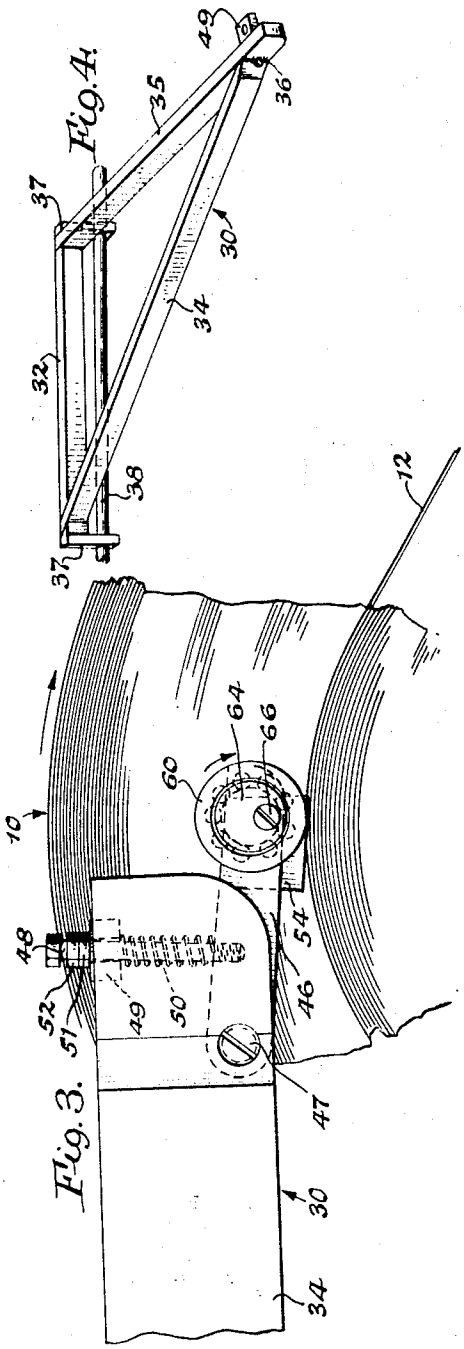


Fig. 4.

Fig. 3.

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WEB SLITTING MACHINE

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U.S. Cl. 83—102
6 Claims

ABSTRACT OF THE DISCLOSURE

The invention provides an improved mechanism for slitting a paper web which is spirally wound in mill roll form while withdrawing from the roll one portion of the severed web. The mechanism comprises a bracket swingable toward and away from the mill roll axis and pivotally mounting thereon a knife support arm to extend in swingable relation thereto and carrying a knife blade disposed to engage the mill roll web to sever it longitudinally. The parts are so arranged that the knife cutting edge moves in the plane of the severed face of the unwound portion of the roll. The bracket member is controlled to move relative to the mill roll web by a device providing both knife-cutting pressure regulation and bracket oscillation damping. The knife support arm includes roller means riding on the unwinding portion of the web and is positionally adjustable thereon for regulation of the depth of cut; and a spring device is operably associated with the blade support arm and the bracket to damp and cushion relative movements thereof.

This invention relates to a web slitting mechanism; and more particularly to an improved means for slitting a paper web as it unwinds from a supply roll in conjunction with a printing operation or the like. The invention is of particular utility in that it makes feasible the purchase and/or stocking of "standard width" rolls of paper web (thereby effecting substantial cost economies) and subsequent slitting from such "standard width" rolls the desired width web feed to a continuous printing process or the like, while leaving on the roll core in undisturbed condition the remaining width of web supply material for subsequent use. This precludes the necessity for any subsequent rewinding of the unused mill roll material, thereby effecting further overall operating economies.

It is the object of the present invention to provide means for accomplishing the above stated purposes.

The invention is illustrated by way of example in the accompanying drawing, wherein:

FIG. 1 is a semi-schematic side elevational view of a web slitting apparatus of the invention such as may be used in association with a web-fed rotary printing press operation as illustrated fragmentarily therein;

FIG. 2 is an enlarged scale fragmentary end elevational view taken as indicated at 2—2 in FIG. 1;

FIG. 3 is a fragmentary enlarged scale view of the portion of the apparatus outlined at "FIG. 3" in FIG. 1; and

FIG. 4 is a top perspective view of a portion of the mechanism of FIG. 1.

As shown by way of example in the drawing herewith, the invention is particularly applicable to the use of a "stndard width" roll of paper webbing or the like as indicated at **10**, whenever it is desired to first use a reduced width portion of the paper web (as indicated at **12**) to supply a web-fed rotary press type printing machine or the like as indicated generally at **15** (FIG. 1). The standard width mill roll **10** is mounted for unwinding on trunnion bearings **16** carried by pedestal frame structures **18** standing at opposite ends of the roll; the supply roll being thereby operatively aligned with the printing press

web intake drive roll mechanism such as is indicated generally at **20**.

More specifically, the supply roll **10** and its unwind journaling arrangement is laterally positioned so that the prescribed width supply web **12** properly feeds into the printing press, and as illustrated at FIG. 1 the pedestal frames **18** will preferably be mounted on rollers **21** running on parallel tracks **22—22**, to facilitate accurate registering of the mill roll relative to the printing plates, and also to facilitate subsequent shifting of the mill roll to bring the previously unused portion of the web supply into registry with the printing plates. As shown herein by way of example, the printing press includes a series of idling web guide rollers **22** leading the web portion **12** to train around the printing press impression cylinder **24** while the printing plate cylinder **25** bears against the moving web. As shown herein by way of further example, the printed web thereupon trains around a dryer cylinder as indicated at **26**, and is then further processed as may be required in accordance with conventional procedures.

The apparatus for slitting the paper web from the standard width roll so as to provide the delivered web **12** of prescribed width includes a floating beam structure such as illustrated generally at **30**. The structure **30** comprises a base bar member **32** from which extend in triangular relation a pair of struts **34–35** interconnected as by welding or the like at the apex of the structure as indicated at **36**. The base bar **32** is keyed by means of brackets **37—37** upon a rod **38** which is pivotally journaled in stationary brackets **39—39** extending rigidly from the machine frame members **18—18**. As shown at FIGS. 1, 2, the rod **38** carries a crank arm **40** to which a pneumatic cylinder-piston unit **42** operatively connects as indicated at **44**. The cylinder **42** is based upon the machine frame and is controllable by the machine attendant to simultaneously regulate the counterbalancing effects of the cylinder unit relative to the weight of the slitter support frame structure, and to damp any tendencies of the structure to "bounce" relative to the paper roll during the web slitting operation.

The beam structure **30** carries at its apex end portion a knife support arm **46** (FIG. 3) which is mounted theareon in freely pivotable relation as indicated at **47** to extend in cantilever relation therefrom. The lowermost position of the outer end of the bar **46** relative to the beam **30** is controlled by means of a screw **48** which screw-threads in fixed relation at its lower end into the arm **46** and slide-fits at its upper end through a bored bracket portion **49** of the beam structure **30**. A compression spring **50** is provided to further cushion the knife action relative to the web supply roll. Lock nuts as shown at **51, 52**, are provided to permit regulation of the permissible downthrow of the arm **46** relative to the beam **30** in response to action of the spring **50**, for adjustments of the angle of approach of the knife edge to the mill roll periphery for optimum cutting results. The arm **46** is formed with a vertically inclined side wall portion as shown in FIG. 2 to accommodate in flat-mounted relation thereagainst a slitter blade **54** which is held thereon in vertically inclined attitude by means of a cover plate **55** and flat-headed screws **56**. The cutting edge of the slitter blade **54** is sharply bevelled as indicated at **57**, and the parts are dimensioned and relatively arranged so that the cutter blade is adapted to descend vertically as it slits successive convolutions of the web of the roll **10**; the portion **12** thereof being thereupon free to unwind from the roll as it is pulled into the printing press by means of the mechanism indicated generally at **20**. It is to be understood that the mechanism **20** is power-driven in synchronism with the other rotating components of the printing press so that the prescribed width web **12** is with-

drawn from the supply roll in strict symphony with the operation of the printing press.

It is of course a prime requisite to optimum operation of the mechanism that the slitting blade **54** descends in a precisely vertical plane as it cuts progressively through successively presented convolutions of the supply roll **10**; and ideally the mechanism will be adjusted so that the blade cuts through only the upper-most layer of web material as it unwinds from the supply roll. For this purpose the device of the invention includes a "position control" roller **60** comprising a typical ball or roller bearing assembly having its inner race or core **64** adjustably fixed to the arm **46** by means of an eccentric mounting, as by means of a screw as indicated at **66**. Thus it will be understood that up loosening of the screw **66** the core **64** of the roller mount may be swivelled thereon so as to adjust the vertical disposition of the roller bearing unit relative to the support arm **46**, whereby the depth of the slitting operation may be readily regulated to suit different paper thicknesses and/or other operational preferences.

It is a particular feature of the machine of the invention that it is adapted to slit a web as described hereinabove with uniform and continuous accuracy although the mill roll carrying the web may be of a uneven peripheral contour and rotating at high speed. The cylinder unit **42** is readily adjustable to operate in consonance with a large variety of operational variables such as speed of mill roll rotation; irregularities in the roll peripheral contour, irregularities in the paper web thickness, and/or other web cutting control factors, and the like. For this purpose as shown in FIG. 1, the compressed air supply line to the cylinder **42** includes an air flow rate control valve as indicated at **70**, as well as a pressure regulator as indicated at **72**. Thus, regulation of the pressure control device **72** will adjust the counter-balancing effect of the cylinder unit so as to provide the desired riding pressure of the knife blade against the paper web. On the other hand, manual adjustments of the air flow rate control valve **70** will adjust the rate of cylinder-piston response to bouncing tendencies of the cutter support arm such as may be induced by irregular mill roll profile conditions.

It will also be understood that whereas the bracket **30** and knife support arm **46** have been illustrated and described hereinabove as being arranged to extend substantially horizontally and to swing vertically, the invention may with equal facility be embodied in a mechanism wherein the bracket and support arm members extend at any other attitude, so long as they are mounted to swing at their free ends towards and away from the axis of the mill roll. Thus, for example, the bracket and support arm members may be mounted to hang vertically on their pivotal supports; the knife cutting pressure being then provided solely by the regulated action of the cylinder **42**.

Thus, it will be apparent that the machine of the invention facilitates the use of standard width mill rolls of supply web material whereby substantial stock purchasing and warehousing economies may be effected; and furthermore features a machine which is readily adjustable in various respects so as to avoid undesirable "bouncing" of the cutting blade relative to the paper web, whereby continuously accurate depth slitting of the web convolutions on the mill roll may be realized.

It will of course be understood that whereas the web slitting knife **54** as shown herein is of the straight edge blade type, any other suitable type, such as a rotating circular blade or the like may be employed in lieu thereof. Furthermore, although only one form of the machine of the invention has been illustrated and described in detail by way of example, various changes may be made without departing from the spirit of the invention or the scope of the following claims.

What is claimed as my invention is:

1. In a paper web slitting system for progressively severing consecutive convolutions of a rotatably mounted mill web supply roll wherein one portion of the sliced web is being unwound from the mill roll after it is severed therefrom and wherein the other portion of the mill roll web is left undisturbed in rolled form thereon, the improvement comprising:

a web slitting mechanism including a bracket mounted by pivot means at one end upon a stationary support to be swingable at its free end toward and away from the mill roll axis while being restrained by said pivot means to move only in an arc paralleling the severed face of the mill roll,

a knife support arm pivotally mounted upon the free end portion of said bracket to extend in swingable relation thereon, attitude control means interconnecting said arm and said bracket providing manually adjustable degrees of positive limitations on swinging movements of said arm relative to said bracket, and spring means in operative association with said bracket and said arm and operable to cushion and damp movements of said support arm relative to said bracket,

a control roller mounted adjacent the free end of said support arm and being so positioned as to ride on the unwinding portion of the web, said control roller being positionally adjustable on said support arm,

and a blade knife carried by the free end portion of said support arm,

whereby positional adjustments of said control roller on said support arm regulate the depth of cut of said blade.

2. A web slitting mechanism as set forth in claim **1** wherein said bracket comprises a triangularly-shaped truss structure the base portion of which is pivotably mounted at horizontally spaced positions upon stationary support means and one side leg portion thereof extends horizontally in a direction parallel to the plane of severance of said mill roll and terminates at the apex portion of said truss structure which is positioned substantially tangentially of the mill roll.

3. A web slitting mechanism as set forth in claim **1** wherein said knife support arm includes an inclined surface and against which said knife blade is detachably fixed, said knife blade having a bevelled cutting edge thereby disposed in the plane of severance of said mill roll whereby said bevelled edge portion of said blade moves in said plane as the blade cuts through successive convolutions of the mill roll web.

4. A web slitting mechanism as set forth in claim **1** wherein an operably-adjustable pressure control device is associated with said bracket for regulating the loadings of the mechanism on said knife blade.

5. A web slitting mechanism as set forth in claim **4** wherein said control device includes means for damping oscillations of said bracket about its pivotal mounting.

6. A web slitting mechanism as set forth in claim **1** wherein said spring means is adjustable to regulate the resiliency control thereof over oscillations of said knife support arm relative to said bracket.

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U.S. Cl. X.R.

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